

# NATIONAL CANCER INSTITUTE AND NATIONAL SCIENCE FOUNDATION TRAINING GRANT COLLABORATION

## FACT SHEET

September 2005

For the past seven years, the National Cancer Institute (NCI) has taken the lead in integrating nanotechnology into biomedical research through a variety of programs. The results of these efforts have demonstrated clearly that melding nanotechnology and cancer research and development efforts will have a profound, transformative effect on how we diagnose, treat, and prevent cancer.

But nanotechnology for biomedical applications involves elements of numerous disciplines that have traditionally worked independently. To address the need for a pool of scientists trained across the disciplines that specifically encompass cancer nanotechnology, the NCI is collaborating with the National Science Foundation (NSF) to train U.S. doctoral students in science, technology, engineering, and mathematics disciplines.

The collaboration is awarding \$12.8 million in grants to four institutions over the next five years, through the NSF's Integrative Graduate Education and Research Traineeship Program (IGERT). The IGERT program, initiated in 1997, is ideally suited to cancer nanobiotechnology training based on its mission and track record in interdisciplinary training support. All of the four funded projects described below are linked to regional cancer centers and the biomedical research community:

- **Integrative Nanoscience and Microsystems, University of New Mexico**  
This program is collaboration between the University of New Mexico's Center for High Technology Materials, located within the School of Engineering, the College of Arts and Sciences and the Cancer Research and Treatment Center. The collective goal is to prepare diverse, well-rounded, and globally minded graduates with a comprehensive understanding of multiple scientific disciplines, who can utilize nanoscale phenomena to create macro-scopic functionality. The unifying theme of integrative nanoscience and microsystems is maintained in both the education and research components and realized by three technical emphasis areas: bio interfaces, information nanotechnology and complex functional materials. The program will enhance the educational opportunities of all students by supporting the development of a new graduate degree program in nanoscience and microsystems.

The principal investigator is Diana Huffaker, Ph.D.

Web site: <http://www.chtm.unm.edu/igert>

- **NanoPharmaceutical Engineering and Science, Rutgers University**

This collaboration between Rutgers, the New Jersey Institute of Technology and the University of Puerto Rico, will prepare a diverse set of trainees to develop a wide array of nanoparticle-based biocompatible drug delivery systems, including DNA-based delivery systems for brain cancer, and preventive agents. The project will include training in nanoparticle product and process design. The program, which will coordinate with the Cancer Institute of New Jersey, will also provide training opportunities with pharmaceutical and biotechnology companies in New Jersey and Puerto Rico.

The principal investigator is Fernando Muzzio, Ph.D.

Web site: <http://www.rutgers.edu>

- **Nanomedical Science and Technology, Northeastern University**

Nanomedicine is a new interdisciplinary paradigm emerging from the timely convergence of two parallel recent developments – the decoding of the human genome that has led to greater understanding of the molecular basis of medicine and biology, and nanotechnology, which offers the means to control molecular interactions. IGERT Nanomedical Science and Technology is a new integrated doctoral education program that emphasizes interdisciplinary research training in diverse areas including nanostructured materials, nanomagnetism, cell biology and trafficking, optical microscopy and imaging, sensors and diagnostic systems, drug and gene targeting and delivery, and synthesis and surface functionalization and characterization of nanostructures, and theoretical computational modeling. Significant research breakthroughs are anticipated in cellular biosensors for cancer diagnostics, magnetic bio-control, targeted drug delivery and mitochondrial gene delivery for cancer therapy, bio-nano machines and nanomanufacturing. Interdisciplinary pedagogical coursework is integrated with practical real-world experience through graduate internships in biotechnology, pharmaceutical and medical device companies and research hospitals, with co-mentoring by industrial and medical research scientists. A key feature of the program is a strong diversity component, incorporating significant involvement of women and minorities in the student body and the teaching, mentoring, and administrative aspects of the project. The program aims to educate the next generation of scientists and technologists with the requisite skill sets to address scientific and engineering challenges, with the necessary business, ethical and global perspectives that will be needed, in the rapidly emerging area of applying nanotechnology to human health.

The principal investigator and director is Srinivas Sridhar, Ph.D.

Web site: <http://www.nanotech.neu.edu/medicine/igert.htm>

- **Building Leadership for the Nanotechnology Workforce of Tomorrow, University of Washington**

This joint institute for nanotechnology involving University of Washington, Pacific Northwest National Laboratory, and Fred Hutchinson Cancer Research Center, will focus on new directions in bionanotechnology. Such directions include medical applications of nanoscale platforms; use of nanoscale tools to understand biological mechanisms underlying disease and to diagnose and treat disease; and combining expertise and techniques across physical science, biomedicine and engineering.

The principal investigator is Marjorie Olmstead, Ph.D.

Web site: <http://www.washington.edu>

### **About the NCI Alliance for Nanotechnology in Cancer**

To help meet the goal of eliminating suffering and death due to cancer, the National Cancer Institute is engaged in efforts to harness the power of nanotechnology to change the way we diagnose, treat and prevent cancer. The NCI Alliance for Nanotechnology in Cancer is a comprehensive, systematized initiative encompassing the public and private sectors, designed to accelerate the application of the best capabilities of nanotechnology to cancer. Among the Alliance goals are to develop research tools to identify new biological targets, as well as agents to monitor predictive molecular changes in order to prevent precancerous cells from becoming malignant. In addition, the Alliance promotes the development of better diagnostics and treatment regimens using nanotechnology to target specific cancer cells amongst healthy cells.

The Alliance for Nanotechnology in Cancer is an integrated, milestone driven, and product-oriented program with targeted objectives and goals, initiated to capitalize on opportunities to create the tools that both clinicians and cancer researchers need now to eliminate suffering and death from cancer. By working to fulfill this core mission of the NCI, the Alliance offers training and career development mechanisms to direct talent to this area as quickly as possible and to incentivize cross-disciplinary research through training the scientific community. For more information on the NCI Alliance for Nanotechnology in Cancer, please visit <http://nano.cancer.gov>.

### **About the National Cancer Institute**

The National Cancer Institute (NCI) is a component of the National Institutes of Health (NIH), one of eight agencies that compose the Public Health Service (PHS) in the Department of Health and Human Services (DHHS). The NCI, established under the National Cancer Act of 1937, is the Federal Government's principal agency for cancer research and training. For more information about NCI, please visit <http://www.cancer.gov>.

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**About the IGERT Program**

The Integrative Graduate Education and Research Traineeship (IGERT) program, initiated in 1997 and now comprising approximately 150 projects nationwide, has been developed to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become in their own careers the leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative new models for graduate education and training for collaborative research that transcends traditional disciplinary boundaries. Projects funded through the IGERT program seek to increase the participation of underrepresented groups, including women and minorities, in doctorate programs in the engineering, science and mathematics fields, thereby tapping into a bountiful resource opportunity to advance cancer research. For more information on the IGERT program, please visit <http://www.igert.org>.

**About the National Science Foundation**

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." With an annual budget of about \$5.5 billion, NSF is the funding source for approximately 20 percent of all federally supported basic research conducted by America's colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing. For more information on the NSF, please visit [www.nsf.org](http://www.nsf.org).

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